

Appl. No. 09/675,113
Amdt. Dated July 2, 2004
Reply to Office action of April 5, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Previously Presented) Embodied in a memory component, a digitally signed image comprising:
 - a post-relocation image being a result formed by alteration of a pre-relocation image of a software module upon loading of the image into the memory component;
 - information to convert the pre-relocation image to the post-relocation image; and
 - a digital signature based on the pre-relocation image.
2. (Original) The digitally signed image of claim 1, wherein the digital signature is a hash value of the pre-relocation image digitally signed by a private key of a selected signatory.
3. (Cancelled).
4. (Previously Presented) The digitally signed image of claim 1, wherein the information includes offsets for addressing routines within the software module.
5. (Previously Presented) The digitally signed image of claim 4, wherein the offsets are generated after the software module is compiled and placed into an executable format.
6. (Original) Embodied in a memory component, a digitally signed image comprising:
 - a Bound & Relocated Import Table (BRIT);
 - an import table;
 - an export table;
 - an image of a software module; and
 - a digital signature based on the import table, the export table and the image.

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7. (Original) The digitally signed image of claim 6, wherein the import table comprises a plurality of entries, each entry includes an identifier that indicates what segment of information contained in another digitally signed image is required by the image.

8. (Original) The digitally signed image of claim 7, wherein the identifier includes a unique sequence of byte values.

9. (Original) The digitally signed image of claim 7, wherein the identifier includes a unique sequence of alphanumeric characters.

10. (Original) The digitally signed image of claim 7, wherein each entry of the import table further includes an offset to a corresponding entry of the BRIT.

11. (Original) The digitally signed image of claim 6, wherein the export table includes a plurality of entries forming a listing of segments of information contained in the image, a selected entry of the plurality of entries includes an identifier of a segment of information associated with the segments of information.

12. (Original) The digitally signed image of claim 11, wherein the selected entry further includes a second offset being an offset from a starting address of the digitally signed image to an address location of the segment of information.

13. (Previously Presented) A method comprising:
reconverting a post-relocation image of a digitally signed image back to a pre-relocation image, the pre-relocation image being an image of a software module prior to relocation where an address with the digitally signed image is changed;

conducting a hash operation on the reconverted, pre-relocation image to produce a reconverted hash value;

recovering a hash value from a digital signature contained in the digitally signed image, the hash value is based on the pre-relocation image of the software module; and

comparing the hash value to the reconverted hash value.

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14. (Original) The method of claim 13 further comprising:
determining that an integrity of the post-relocation image remains intact if the hash value matches the reconverted hash value.

15. (Original) The method of claim 13 further comprising:
determining that the post-relocation image has been modified beyond any modification caused by relocation when the hash value fails to match the reconverted hash value.

16. (Original) The method of claim 13, wherein the hash operation is a one-way hash operation.

17. (Original) A method for generating a Bound & Relocated Import Table (BRIT) within an electronic device, comprising:

(a) locating an import table for a first digitally signed image loaded within the electronic device, each entry of the import table including an identifier and a first offset;

(b) accessing an identifier within a selected entry of the first digitally signed image;

(c) determining whether the identifier matches an identifier within an export table of a second digitally signed image loaded within the electronic device, the identifier for the export table is stored with a corresponding second offset; and

(d) upon determining that the identifier within the selected entry matches the identifier within the export table,

producing an address by combining the second offset with a starting address of the second digitally signed image, and

loading the identifier within the selected entry and the address into an entry of the BRIT.

18. (Original) The method of claim 17 further comprising:
repeating the operations of (a)-(d) for each remaining entry of the import table for loading resultant address and identifier pairs into different entries of the BRIT.

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19. (Original) The method of claim 17, wherein the producing of the address by combining the second offset with the starting address of the second digitally signed image comprises an arithmetic operation.

20. (Original) The method of claim 17, wherein prior to locating an import table for the first digitally signed image, the method further comprises locating a plurality of digitally signed images loaded within the electronic device.

21. (Original) A method comprising:
verifying an integrity of a plurality of digitally signed images loaded in an electronic device, the plurality of digitally signed images includes a first digitally signed image and a second digitally signed image;
determining whether an identifier in an import table of the first digitally signed image matches an identifier in an export table of the second digitally signed image; and
determining whether an entry of a Bound & Relocated Import Table (BRIT) corresponding to the identifier in the import table points to an address defined by the identifier in the export table.

22. (Original) The method of claim 21, wherein the verifying the integrity of the plurality of digitally signed images includes
performing a hash operation on the import table, the export table and an image of the first digitally signed image to produce a first resultant hash value;
recovering a first hash value from a digital signature contained in the first digitally signed image; and
comparing the first hash value with the first resultant hash value.

23. (Original) The method of claim 22, wherein the verifying the integrity of the plurality of digitally signed images further comprises
performing a hash operation on an import table, an export table and an image of the second digitally signed image to produce a second resultant hash value;

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recovering a second hash value from a digital signature contained in the second digitally signed image; and

comparing the second hash value with the second resultant hash value.

24. (Previously Presented) An electronic device comprising:

a processor; and

a non-volatile memory component in communication with the processor, the non-volatile memory component includes including

a post-relocation image being an image of a software module altered during relocation in which an address associated with the image is adjusted before loading the post-relocation image into the memory component,

information to convert the image into the post-relocation image, and

a digital signature based on the image of the software module.

25. (Cancelled).

26. (Previously Presented) The electronic device of claim 24, wherein the information placed within the non-volatile memory component includes an offset from a starting address of the image of the software module.

27. (Original) An electronic device comprising:

a processor; and

a memory in communication with the processor, the memory being loaded with a Bound & Relocated Import Table (BRIT), an import table, an export table, an image of a software module, and a digital signature based on the import table, the export table and the image.

28. (Original) The electronic device of claim 27, wherein the import table loaded within the memory comprises a plurality of entries, each entry includes an identifier that indicates what segment of information contained in another digitally signed image is required by the image.

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29. (Original) The electronic device of claim 28, wherein the identifier associated with a particular entry includes a unique sequence of byte values.

30. (Original) The electronic device of claim 27, wherein the export table includes a plurality of entries forming a listing of segments of information contained in the image, a selected entry of the plurality of entries includes an identifier of a segment of information associated with the segments of information.

31. (Previously Presented) Embodied in a processor readable medium for execution by a processor, a software program comprising:

a first software module to reconvert a post-relocation image of a digitally signed image back to a pre-relocation image, the pre-relocation image being an image of a software module prior to adjustment of an address corresponding to an address location allotted for the post-relocation image;

a second software module to conduct a hash operation on the reconverted, pre-relocation image to produce a reconverted hash value;

a third software module to recover a hash value from a digital signature contained in the digitally signed image, the hash value is based on the image of the software module; and

a fourth software module to compare the hash value to the reconverted hash value.

32. (Original) The software program of claim 31 further comprising:

a fifth software module to determine that an integrity of the post-relocation image remains intact if the hash value matches the reconverted hash value.

33. (Original) The software program of claim 31 further comprising a sixth software module to determine that the post-relocation image has been modified beyond any modifications caused by relocation when the hash value fails to match the reconverted hash value.